

What is claimed is:

1. A method for the reduction of fouling comprising the steps of:

422/22
5 applying an electric charge to an object within the flow path of a fluid stream, wherein said fluid stream contains contaminants;
flowing said fluid stream past said electric charge; and,
adjusting the magnitude of said electric charge while continuing said flowing step.

- 10 2. The method according to Claim 1, wherein said step of applying an electric charge to an object comprises applying an electric charge to an object upstream to downstream of a heat exchanger.

3. The method according to Claim 2, wherein said step of applying an electric charge to an object upstream of a heat exchanger comprises applying an electric charge to an auxiliary device immediately upstream of a heat exchanger.

- 15 4. The method according to Claim 3 wherein said step of applying an electric charge to an auxiliary device immediately upstream of a heat exchanger comprises applying an electric charge to an object selected from the group consisting of a vessel, a section of pipe, and a spare heat exchanger.

5. The method according to Claim 1, wherein said step of applying an electric charge to an object comprises applying an electric charge to a heat exchanger.

- 20 6. The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to the chassis or shell of said heat exchanger.

7. The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to baffles of said heat exchanger.



8. The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to a floating head of said heat exchanger.
- 5 9. The method according to Claim 5 wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to one or more tubes or to the tube bundle of said heat exchanger.
- 10 10. The method according to Claim 1 wherein said step of applying an electric charge to an object comprises applying an electric charge to a slurry settler.
- 11 11. The method according to Claim 10 wherein said step of applying an electric charge to a slurry settler comprises applying an electric charge to the conical section of a slurry settler.
- 12 12. The method of Claim 1 wherein said step of applying an electric charge comprises applying a constant electric charge.
- 13 13. The method of Claim 1 wherein said step of applying an electric charge comprises applying a modulated electric charge.
- 14 14. The method of claim 1, further comprising determining the level of contaminants in the fluid stream.
- 15 15. The method of claim 15 wherein said step of determining utilizes measurement of the turbidity of the fluid stream or an analytical measurement indicative of contaminant concentration of the fluid stream.
- 16 16. The method of Claim 1 wherein said step of applying an electric charge comprises applying an attractive electric charge.
- 17 17. The method of Claim 1 wherein said step of applying an electric charge comprises applying a repulsive electric charge.

18. A distillation apparatus having reduced maintenance requirements comprising:

a distillation column;

a heat exchanger in thermal contact with said distillation column; and,

a voltage source having means for supplying a voltage to said heat exchanger.

5 19. The apparatus of Claim 18 further comprising a feedback apparatus which automatically controls the voltage supplied by the voltage source in response to changes of contamination levels in a fluid stream.

10 20. The apparatus of claim 19, wherein said feedback apparatus utilizes turbidity, conductivity, resistivity, or analytical measurements to determine contaminant levels in the vicinity of the heat exchanger.

21. The apparatus of claim 20, wherein said voltage source applies said voltage to a heat exchanger, a slurry settler, or an auxiliary device.

22. A heat exchanger comprising:

an outer shell;

a fluid inlet associated with said outer shell;

fluid outlet tubes for receiving fluid from said fluid inlet;

bundles in fluid contact with said fluid inlet; and,

means for receiving a voltage source.

15 20 23. The heat exchanger of claim 22, further comprising a voltage source attached to said means for receiving.

24. The heat exchanger of claim 22 wherein said means for receiving comprises electrically couplable connections and an electrical channel.

25. The heat exchanger of claim 23, wherein said voltage source is adjustable.

25 26. The heat exchanger of claim 25, wherein said adjustable voltage source is adjusted based upon the level of contaminants in a fluid stream.